

FORT WORTH & DENVER CITY RAILROAD UNDERPASS
(Burlington Northern Santa Fe Railroad Underpass)
Texas Historic Bridges Recording Project II
Spanning State Hwy. 183 at the Burlington Northern Santa Fe Railroad
Fort Worth
Tarrant County
Texas

HAER No. TX-93

HAER
TEX
220-FOWOR,
4-

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C St. NW
Washington, DC 20240

HISTORIC AMERICAN ENGINEERING RECORD
FORT WORTH & DENVER CITY ^{RAILROAD} ~~RAILWAY~~ UNDERPASS

(Burlington Northern Railroad Underpass)

HAER No. TX-93

HAER
TEX
220-FOND
4-

Location: Spanning S.H. 183 at Burlington Northern Railroad, Fort Worth, Tarrant County, Texas
UTM: 14/655587/3629620
USGS Quad: Fort Worth, Tex.

Date of Construction: 1935

Designer: George G. Wickline, Texas Highway Department; and Office of the Engineer, Fort Worth & Denver City Railway

Builder/Contractor: Butcher-Sweeney, Contractors, Fort Worth, Texas

Present Use: Railroad underpass

Significance: An example of Fort Worth's exceptional network of grade separation structures, the underpass serves as a good example of a cooperative effort by the Texas Highway Department and the U.S. Bureau of Public Roads to eliminate dangerous grade crossings in Texas during the Great Depression.

Historian: Robert W. Jackson, Ph.D., August 2000

Project Information: This document was prepared as part of the Texas Historic Bridges Recording Project II performed during the summer of 2000 by the Historic American Engineering Record (HAER). The Project was sponsored by the Texas Department of Transportation (TxDOT), Environmental Affairs Division.

The Fort Worth & Denver City Railway Underpass at State Highway (S.H.) 183 in Fort Worth, Texas, was built in 1935 to span tracks of the Fort Worth & Denver City Railway (FW&DC). The Texas Highway Department and the U.S. Bureau of Public Roads constructed it as part of a systematic attempt during the 1930s to improve urban grade separation structures. This effort was in response to an explosive growth in automobile and truck traffic during the early decades of the twentieth century, which led to dangerous conflicts at points of intersection between road and rail transportation systems.

The roots of this conflict in the Fort Worth area may be traced to the rail promotion activities of civic, business, and political leader Buckley Burton Paddock (1844-1922). As editor of the Fort Worth *Democrat*, Paddock published the so-called "Tarantula Map" on 26 July 1873, which depicted nine railroad lines radiating like a spider's legs from Fort Worth. Although there were no railroads terminating in Fort Worth when the map was first published, it served as a visual representation of the hope that Paddock and other civic boosters had for their city's future.

Due in large part to Paddock's vigorous promotion at the local, state, and national levels, the Texas & Pacific Railroad succeeded in completing the first rail line into Fort Worth on 19 July 1876. Seven other railroads entered the city during the following decade, but it was not until formation of the Fort Worth & Denver Terminal Railway in 1890 that the FW&DC actually gained entrance into the city. Arrival of the International & Great Northern Railroad in 1903 essentially completed the network of railroads envisioned by Paddock in 1873.¹ This pattern of rail lines was therefore well established by dawn of the automobile age.

A rapid increase in automobile ownership during the first decade of the twentieth century led to a dramatic rise in fatalities and serious injuries at points where rail lines crossed roads. Warning signs were often inadequate or non-existent, and the motoring public was generally ignorant of the danger posed by the trains. Railroad corporations usually defended their right-of-way as paramount, and blamed motorists for the accidents that occurred. Reluctant to spend the great amounts of money necessary for a systematic program of grade separation, the railroads generally consented to build structures on a case-by case-basis only when forced to do so by the city or county governments. But urban growth and industrialization would eventually combine to force railroad corporations and public officials toward greater effort in the elimination of conflicts at grade.

After a brief depression following the end of the First World War, the United States experienced a period of economic expansion that began about 1922, peaked in 1927, and lasted until the beginning of the Great Depression in 1929. This period marked the climax of the so-called "second industrial revolution," an era in which the nation's industrial output nearly doubled and the gross national product rose by approximately forty percent. Electrification, new

¹ Marcelle Hull, "B. B. Paddock and the Railroads of Fort Worth," *The Compass Rose* 9, no. 1 (Spring 1995), 1-5; Ron Tyler, ed., *The New Handbook of Texas*, vol. 5 (Austin, Tex: Texas State Historical Association, 1996), 5; Charles P. Zlarkovich, *Texas Railroads: A Record of Construction and Abandonment* (Austin, Tex.: Bureau of Business Research, University of Texas at Austin, 1981), 64, 67.

technologies, more efficient manufacturing methods, and innovative advertising fueled the rise in the consumer-goods economy that gave Americans the highest standard of living in the world.² Automobile manufacturing had already become the nation's largest industry by 1920, and continued to experience spectacular growth throughout the decade. In 1920, there were 9,239, 100 motor vehicle registrations in the United States; by 1930, the total had increased to 26,749,800. With more cars and trucks on the road, more and better highways were required, and millions of dollars were spent during the 1920s to upgrade the nation's road system. The pace of road improvement did not keep pace with the rise in automobile ownership, however. There were approximately 387,000 mile of paved roads in the United States in 1921, but the figure had increased to only 662,000 by 1929.³

Texas followed national trends with an increase in motor vehicle registrations from 430,377 in 1920, to 1,401,748 in 1930.⁴ Moreover, these vehicles were traveling at a much higher rate of speed, thereby increasing the hazard to the motoring public. Unfortunately, increase in the number and speed of vehicles on the road in the 1920's exceeded the Texas Highway Department's capacity to keep pace with necessary highway improvements. As later noted by an article published in *Texas Parade*, the official publication of the Texas Good Roads Association, during this period "more vehicles, traveling more miles, were turned loose on an already inadequate highway system."⁵

When traffic on the state's highways during the earliest years of the century was relatively light and the average speed relatively low, there seemed to be little need for the construction of grade separation structures, except in those cases where a major highway or trunk line railroad with very heavy traffic was involved.⁶ Because grade separation structures were very expensive, the Texas Highway Department generally elected to provide for increased safety of the motoring public by relocating highways, by improving the grade of the crossings, by cutting brush to increase sight distance, or by erecting more effective warning signs.⁷ But as the

² Robert A. Divine, ed., *America: Past and Present*, vol. 2, 2nd ed. (Glenview, Ill.: Scott, Foresman and Co., 1987), 723-24.

³ Divine *America: Past and Present*, 723-24; Gary B. Nash and Julie Roy Jeffrey, eds., *The American People: Creating a Nation and a Society*, vol. 2 (New York: Harper & Row, 1986), 761-62.

⁴ *Texas Highway Department Ninth Biennial Report: September 1, 1932 to August 31, 1934* (Austin, Tex.: Texas Highway Department, 1934), 31.

⁵ Charles E. Simmons, "Engineering Death Off the Highways," *Texas Parade* (August 1938), 16.

⁶ H. H. Allen, ed., *Texas Highway Department: 1927-1937* (Austin, Tex.: Texas Highway Department, 1937), 113.

⁷ G. G. Wickline, "Grade Crossing Elimination," *Texas Highway Bulletin* 4 no. 1 (January 1924): 25; "Making Texas Highway Safe for Traffic with the Grade Crossing Eliminated," *Texas Highway Bulletin* 8, no. 4 (April 1928):9.

number of accidents involving injury or death at highway-railroad crossings in Texas rose steadily from 201 incidents (68 fatalities) in 1920 to 350 incidents (152 fatalities) in 1929, the importance of separating the grades of highways and rail lines became more apparent.⁸

In 1923, the Texas Railroad Commission collected data from railroad companies operating in the state and found that there were 9,313 public road and farm crossings and 533 street crossings in Texas, but only 165 overpasses and underpasses. Most of the crossing elimination achieved up to this time was due to road relocation, with some of the cost covered by federal funds made available under provisions of the various Federal Aid Acts passed beginning in 1916.

During the 1920's, some of the leading railroad companies began to employ engineers for the special purpose of conferring with state and county officials on the construction of grade separation structures. But cost participation by the railroads during this period was entirely voluntary.⁹ Prior to 1925, when the state or a county desired construction of a grade separation structure, a plan was submitted to the railroad and negotiations were begun regarding the design and cost. Generally, the railroad paid one-half of the cost on any portion of the project within railroad right-of-way, but only contributed about one-third of the cost for work outside their right-of-way.

In 1925, the Texas legislature passed laws by which the county were relieved of construction responsibilities, and from 1925 to 1932 the railroads and the state of Texas split the cost of grade crossing elimination. Passage of the Emergency Relief Appropriations Act of 1932 provided federal funds for the entire cost of grade separation structures, payable through the state.¹⁰ The availability of federal funds allowed the Texas Highway Department and the U.S. Bureau of Public Roads to finally begin a systematic program of new construction and improvement of existing urban separation structures, and a great number were built in the 1930s.

Prior to 1932, the individual railroad company involved prepared plans for an underpass and performed the work itself. After the work was completed and inspected, the state reimbursed the railroad based on the formula agreed to before commencement of construction. In the case of the overpass, the state prepared the design and an outside contractor performed the actual work of construction in the same manner as any other state highway improvement project. After 1932, the state generally accepted responsibility for preparation of a preliminary plan, which was then submitted to the railroad. With input from the U.S. Bureau of Public Road, the railroad then prepared final plans for underpasses, and the state prepared final plans for overpasses. After the U.S. Bureau of Public roads approved a final design, an outside contractor performed the work

⁸ Allen, *Texas Highway Department: 1927-1937*, 113; *Texas Highway Department Ninth Biennial Report: September 1, 1932 to August 31, 1934* (Austin, Tex.: Texas Highway Department, 1934), 8.

⁹ Wickline, G. G. "Grade Crossing Elimination."

¹⁰ *Texas Highway Department Seventh Biennial Report: September 1, 1928 to August 31, 1930* (Austin, Tex.: Texas Highway Department, 1934), 56; Allen, 115.

FT. WORTH & DENVER CITY RAILWAY UNDERPASS
HAER No. TX-93
(Page 5)

under supervision by the state.¹¹

The FW&DC Underpass is located on S. H. 183, also known as NE 28th Street in this area of Fort Worth, approximately 1,500" east of the Stockyards Viaduct. Prior to construction of the highway of which this underpass is a part, that portion of NE 28th Street located just east of North Main Street terminated short of the railroad tracks that now run underneath the viaduct. The gap continued to a point just east of the St. Louis & Southwestern Railway tracks, where NE 28th Street resumed at its intersection with Decatur Avenue. There was no east-west arterial north of Northside Drive, located several blocks south of the stockyards area.

In order to provide for an anticipated increase in east-west urban traffic as this area developed, and to better connect northern Fort Worth with points further east, the Texas Highway Department began a program in about 1933 to extend and improve NE 28 Street as S. H. 15. This involved the construction of several grade separation structures, including the FW&DC Underpass, the adjacent St. Louis Southwestern Railway Underpass, the Stockyards Viaduct, and the Texas & Pacific Railway Overpass located further to the east, near Mt. Olivet Cemetery. Because the construction sites were just outside the Fort Worth city limits at that time, all of these projects were eligible for federal funding under provisions of the National Industrial Recovery Act (NIRA) of 1933. FW&DC Underpass and the adjacent St. Louis Southwestern Railway Underpass were jointly designated as U.S. Public Works Project NRM 634-A, Part 1, indicating that they were part of the NIRA program for extension of the Federal Aid Highway System into and through municipalities. The Texas & Pacific Overpass was designated NRM 634-B, and the Stockyards Viaduct was designated NRM 634-C.

That portion of the proposed highway running under the underpass structures was designed for a 40'-0" road width from curb to curb, with a 1'-0" curb and a 5'-0" sidewalk on each side of the road. In order to provide for a minimum clearance of no less than 14'-0" between the bottom of the underpass girders and the crown of the road, without changing the grade of the railroad tracks, the road had to be placed in a cut. A storm sewer system that included concrete pipes under each underpass was installed to prevent accumulation of water at the low points of the roadway.

The FW&DC Underpass had to support three rail lines with slightly different alignments: the main line; the Swift & Company spur, which served the Swift & Company facility located just northwest of the proposed underpass; and the Kolp spur, which served the Kolp elevator located just to the northeast. Because the main line and the Kolp spur were 50'-9" apart at the point of intersection with the centerline of the proposed road, two rail decks had to be constructed, one supporting the Kolp spur and another supporting the main line and the Swift & Company spur.

The main line and Swift & Company spur deck is supported by fourteen I-beam girders, each 45'-4" in length, spaced 2'-8-1/2" apart. Seven vertical stiffeners are attached to the outer face of each outside girder. The concrete rail deck is 2'-0" in height, including a 3" outside bottom lip that covers the outside top edge of the exterior I-beam. The deck is recessed 1"-0-1/2" at a point 1'-3" from the outside edge on each side to contain the ballast on which the cross

¹¹ Allen, H. H. *Texas Highway Department: 1927-1937*, 116.

FT. WORTH & DENVER CITY RAILWAY UNDERPASS

HAER No. TX-93

(Page 6)

ties rest. Sidewalks, each 4'-0" wide, are located on each side of the deck. Steel brackets, attached to the vertical flanges of the outside girders by gusset plates, support the sidewalks. A steel handrail borders each sidewalk. The Kolp spur deck is supported by six I-beam girders, each 45'-4" in length, spaced 2'-2-9/16" apart. The arrangement of deck, sidewalks and handrails is similar to that for the main line deck.

The girders of each deck rest on box-type concrete abutments that have interior spaces accommodating 5'-0" sidewalks, which are raised above and separated from the roadway by low retaining walls. The Kolp spur abutment has two, three-quarter height arched openings, while the main line and Swift & Company abutment has four arched openings.

The underpass has 40'-0" of curb-to-curb horizontal clearance. The original minimum vertical clearance for the Kolp spur was 16'-4" from the bottom of the girders to the crown in the road, while the original minimum vertical clearance for the main line and Swift & Company spur was 14'-5" from the bottom of the girders to the crown in the road. Steel pipe handrails, extending approximately 3' above the walkway, are located between the two structures and at both ends of their abutments, and in each arched opening. Retaining walls, rising from the sidewalk to the level of the rail deck, fill the space between abutments and slope gently downward on each side. The abutments, roadway retaining walls, and outside retaining walls are scored to provide ornamental embellishment.

The structure maintains its integrity, and is significant as an example of a systematic attempt by the Texas Highway Department and the U.S. Bureau of Public Roads during the 1930s to improve urban grade separation structures in response to the explosive growth of automobile and truck traffic during the early decades of the twentieth century. The Fort Worth & Denver City Railway Underpass serves as an example of a building during the Depression-era street and highway improvement boom that helped make Fort Worth a modern metropolis.

SOURCES CONSULTED

- Allen, H. H., ed. *Texas Highway Department: 1927-1937*. Austin, Tex.: Texas Highway Department, 1937.
- Divine, Robert A., ed. *America: Past and Present*. Vol. 2. 2d ed. Glenview, Ill.: Scott, Foresman and Co., 1987.
- Hull, Marcelle. "B. B. Paddock and the Railroads of Fort Worth," *The Compass Rose* 9, no. 1 (Spring 1995).
- Nash, Gary B. and Julie Roy Jeffrey, eds. *The American People: Creating a Nation and a Society*. Vol. 2. New York: Harper & Row, 1986.
- Simmons, Charles E. "Engineering Death off the Highways." *Texas Parade* (August 1938).
- Texas Highway Department Ninth Biennial Report: September 1, 1932 to August 31, 1934*. Austin, Tex.: Texas Highway Department, 1934.
- Texas Highway Department Seventh Biennial Report: September 1, 1928 to August 31, 1930*. Austin, Tex.: Texas Highway Department, 1934.
- Tyler, Ron, ed. *The New Handbook of Texas*. Vol. 5. Austin, Tex.: Texas State Historical Association, 1996.
- Wickline, G. G. "Grade Crossing Elimination," *Texas Highway Bulletin* 4, no. 1 (January 1924).
- _____. "Making Texas Highway Safe for Traffic with the Grade Crossing Eliminated." *Texas Highway Bulletin* Vol. 8, no. 4 (April 1928).
- Zlatkovich, Charles P. *Texas Railroads: A Record of Construction and Abandonment*. Austin, Tex.: Bureau of Business Research, University of Texas at Austin, 1981.